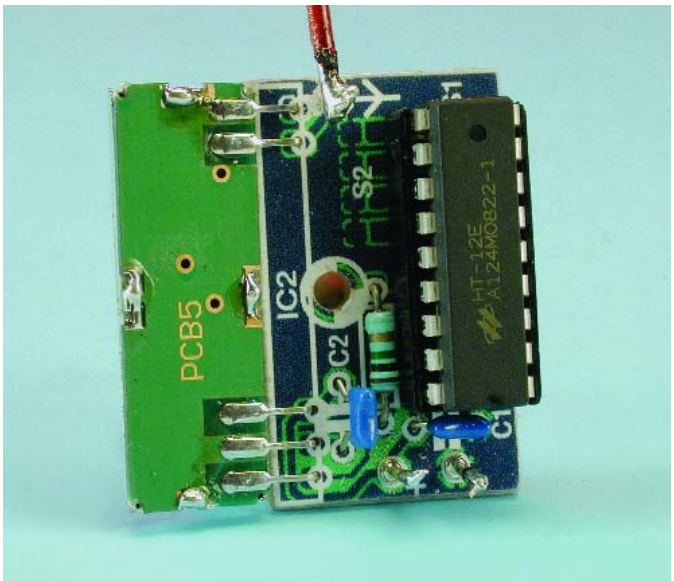
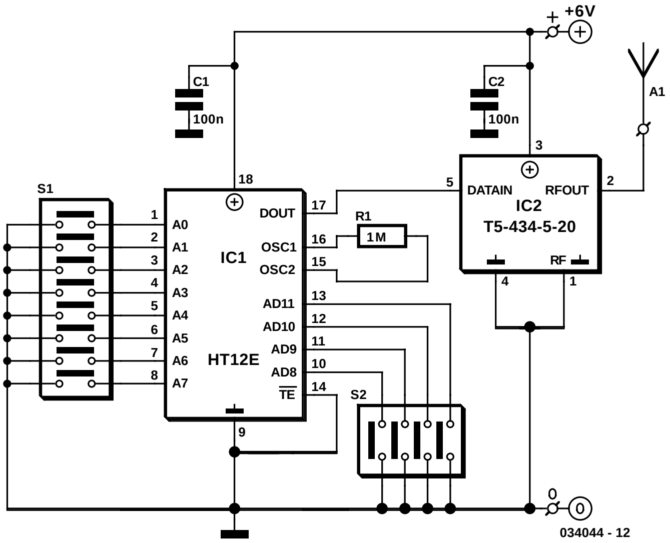
FM Remote Control Transmitter



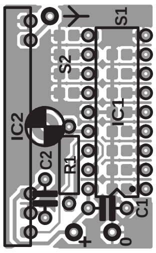


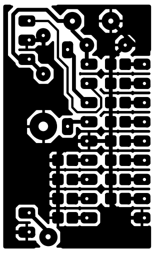
T. Giesberts

This extremely simple transmitter, consisting of only an encoder IC and a 433 MHz licence-exempt TX module, was designed to remotely switch simple appliances on and off. The associated receiver has a relay that can be switched permanently or momentarily and is suitable for various applications (including mains).

For the transmission of a unique signal an encoder is indispensable. For this we've used the HT12E made by Holtek, which we've used previously. Since this is an old favourite there is no need to go into detail and we'll just mention that the oscillator is set to about 3 kHz by R1.

The radio frequency part consists of a standard FM transmitter module from R.F. Solutions, part number T5-434-5-20, which makes the circuit easy to construct and improves its reliability. The transmitter module works at a frequency of 433.92 MHz and has a range of about 400 m according to the manufacturer.





COMPONENTS LIST

Resistors:
R1 = 1MΩ

Capacitors:
C1,C2 = 100nF ceramic

Semiconductors:
IC1 = HT12E (Holtek)
IC2 = T5-434-5-50 R.F. Solutions
(Farnell # 352-4371)

Miscellaneous:
S1,S2 = solder bridges
PCB: see 'FM Remote Control Receiver'

The transmitter module has five pins. Apart from 'data in' (pin 5) and the supply (pin 3), there is a common ground for data and supply (pin 4). Last, but not least, is the RF output (pin 2) with its associated ground (pin 1). The best results are achieved when a 15.5 cm length of stiff wire is used for the aerial. If you want to keep the circuit compact and build it into a small handheld case, you should use a helix aerial. This is wound like a coil, which will be about 34 mm long and consists of 17 turns with an inner diameter of 5 mm. We've used 0.9 mm enamelled copper wire (ECW) for this, which keeps its shape reasonably well (you could use the smooth end of a 5 mm drill bit for winding the wire). The aerial has to be mounted as close as possible to pin 2 of the module. The transmitter module is also available from several other sources, although the part number may be slightly different. Examples are the QFMT5-434-5 from Warwick Wireless Limited and the QFMT5-433B5 from OKWelectronics (www.OKWelectronics.com).

A small PCB has been designed for the transmitter, with room for the transmitter module (IC2) to lie flat along the length of the board. For practical reasons the board is combined with that for the receiver PCB (see 'FM Remote Control Receiver') and needs to be cut from it.

Solder bridges on S1 and S2 are used to set the address and data bits. The current consumption with a supply voltage of 4.5 V (three AA cells for example) is about 9 mA. With a supply voltage of 6 V the current consumption rises to 12.5 mA. These figures apply to the 5 V version of the transmitter module. This is specified for use with a supply between 4.5 and 5.5 V, but has an absolute maximum rating of 10 V, so 6 V won't do it any harm. Furthermore, the 5 V version will still function with a supply of only 2 V, although the range is then much less.

Since the circuit consumes very little current the power can also be provided by button cells. Elsewhere in this issue is a circuit that combines a battery holder for one or two lithium button cells with a miniature automatic switch on a small PCB (see ‘Battery Saver Switch). That circuit is ideal for use as a power source for the transmitter.

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